

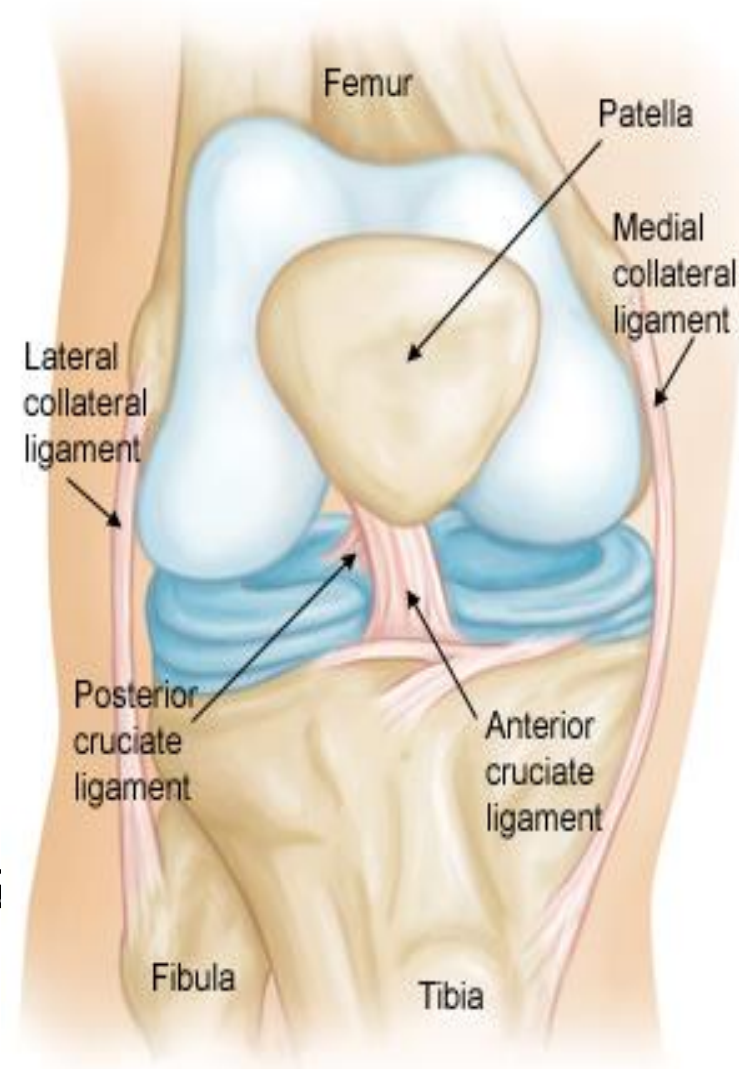
Anterior Cruciate Ligament

By: Hussam Alsaleh

Anatomy

Three bones meet to form the knee joint: (femur), (tibia), and (patella). patella sits in front of the joint to provide some protection.

Bones are connected to other bones by ligaments. There are four primary ligaments in the knee. the function of ligament is to provide stability at the knee joint.



Functional Bundles of Anterior Cruciate Ligament

- **Anterior-medial bundle (most taught in flexion)**
- **Posterior-lateral bundle (most taught in extension). Thought to play a greater role in rotational control.**



Description

injuries to the ACL occur along with damage to other structures in the knee, such as articular cartilage, meniscus, or other ligaments.

Injured ligaments are considered "sprains" and are graded on a severity scale.

- **Grade 1 Sprains** :The ligament is mildly damaged in a Grade 1 Sprain. It has been slightly stretched, but is still able to help keep the knee joint stable.
- **Grade 2 Sprains** :stretches the ligament. This is often referred to as a partial tear of the ligament.
- **Grade 3 Sprains** :This type of sprain is most commonly referred to as a complete tear of the ligament.

Causes

The anterior cruciate ligament can be injured in several ways:

- **Changing direction rapidly.**
- **Stopping suddenly.**
- **Landing from a jump incorrectly.**
- **Direct contact or collision, such as a football tackle.**

Symptoms

- **Pain with swelling.**
- **Loss of full range of motion.**
- **Tenderness along the joint line.**
- **Discomfort while walking.**
- **Popping.**
- **Quad inhibition.**

case study

- **DATE:**8/3/2015 .
- **NAME:** Mr.x
- **Address:** Sakaka.
- **Age:**32 years old.
- **Referral:** ortho.
- **Work:** Teacher Sometimes climb to third floor.
- **Leisure:** Walking twice a day.
- **Discharge:** 28/3/2015

- **Functional disability from present episode:**
Walking for long distance without pain , instability of the knee (some times).
- **VAS Score (0-10) : 6 .**
- **Present symptoms:** Numbness below the knee.
- **Present since:** one month (woresning) .
- **Commenced as a result of:** twisting knee.
- **Worse:** during walking (FWB) & bending knee.
- **Better:** sitting with knee extended.
- **Previous treatments:** ultrasound ➡ improving.

SPECIFIC QUESTIONS

- **Medications:** Voltaren.
- **General Health:** Good.
- ***Imaging:*** (MRI) :
 1. - joint effusion in suprapatellar bursitis.
 2. vertical and horizontal tear medial meniscus.
 3. ACL tear.
- **Recent or major surgery:** before 12years Righ knee.

objective

- **Palpation:** medial pain = (Tenderness).
- **Inspection :** Swelling and redness.
- **ROM:** Full ROM.
- **MMT:** Rt:-4
Lt:5 .
- **Special test:** Lachman Test , Anterior Drawer Test , McMurray Test , Thessaly's tests .
- **Reflex:** Normal.
- **Sensory:** Normal.
- **Gait:** Flexed Knee Gait.

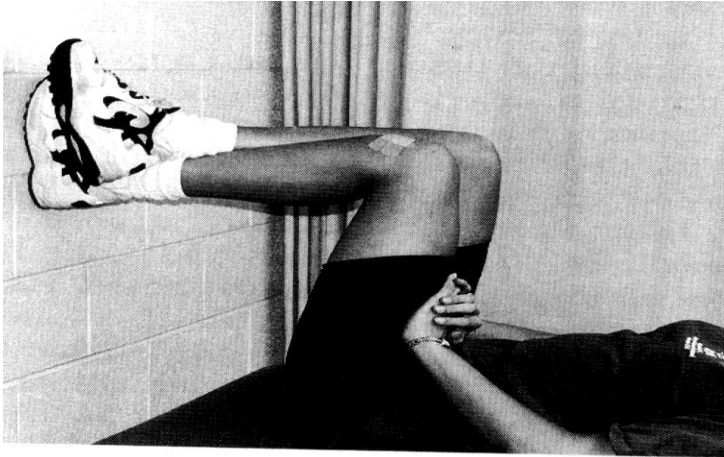
Addition Treatment

- **Pre-operative Considerations:**
 - Modalities to decrease pain and swelling.
 - Resolve the presence of a knee extensor lag.
prior to surgery.
 - Establish 0-120 degrees of ROM.
- **Post-operative Considerations:**
 - Initial graft strength.
 - Fixation.
 - Healing and maturation of the graft.

Post-operative Rehabilitation

- **Joint Mobility: Post-op**
- **Full passive extension within 1-2 weeks post-op.**
- **Full active extension within 3-4 weeks post-op.**
- **90to100 degrees of flexion within 2-3 weeks post-op.**
- **Full flexion by 4-6 weeks post-op.**

Joint Motion Techniques



Treatment

- **Quad Training:**
- **Quad sets**

Recline on your back with your leg as straight as possible.

Tighten the muscles on top of your thigh by pressing your knee into the bed. (Your leg should still be straight and lying on the bed.) Hold for 5 seconds. Do not hold your breath. Relax. Repeat with the other leg.

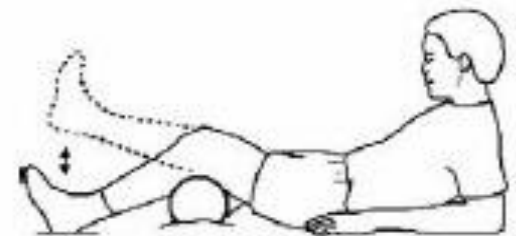


- **Short arc quads**

Place a rolled towel under your knee to bend it about 6 inches.

Raise your foot until your knee is straight.

Hold for 5 seconds, then relax.



- **Straight leg raises**

Bend one knee, placing your foot flat on the bed or floor. Keep your other leg straight, toes pointed up. Slowly raise the straight leg about 12 inches off the bed or floor. Tighten your thigh muscle to keep your knee straight. Slowly lower your leg to the bed or floor.

Repeat with the other leg.



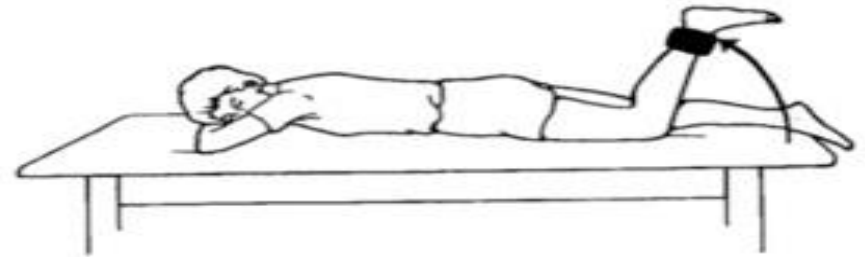
- **Open chain exercise:** (limited to 90°-60° arc)

Use cuff weights initially until patient can tolerate 3 sets of 12 to 15 reps with 10 pounds (4.5 kg).



- **Open chain leg curls:** (limited to 0-90°)

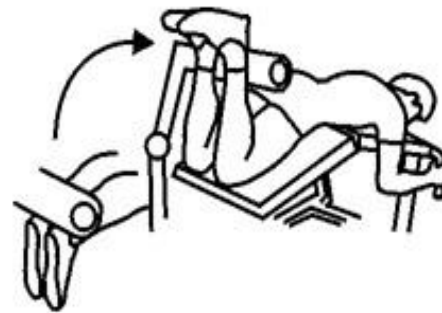
leg curls limited to 0-90 to avoid active insufficiency and hamstring cramping.



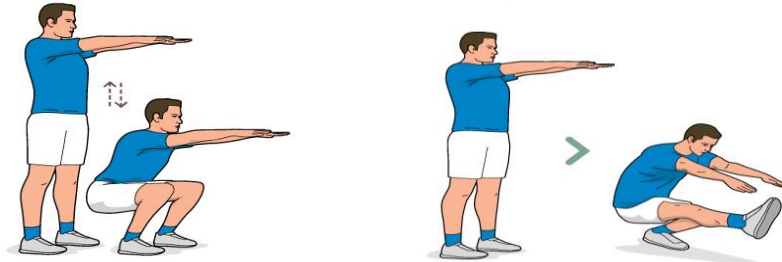
- **Leg extension and curl machines:** (limited 90°-60°)

Begin about 6 weeks post-op.

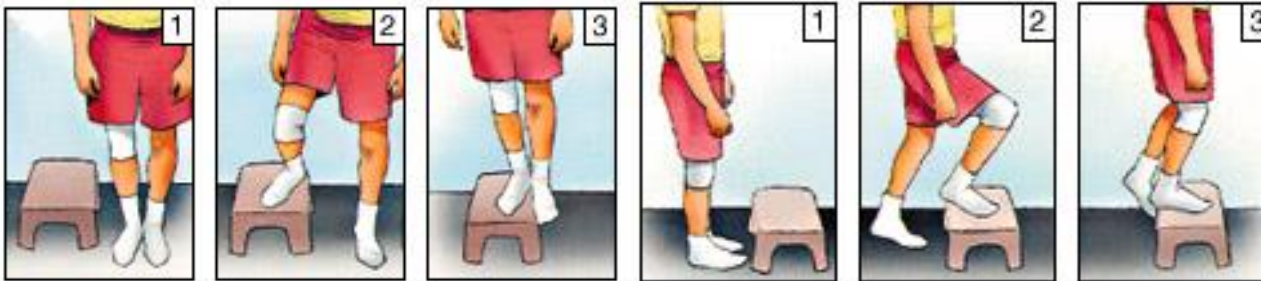
- 1 plate X 3 sets of 10
- Progress to:
 - 1 plate-10 reps.
 - 2 plates – 6-8 reps.
 - 3 plates – 3-5 reps.



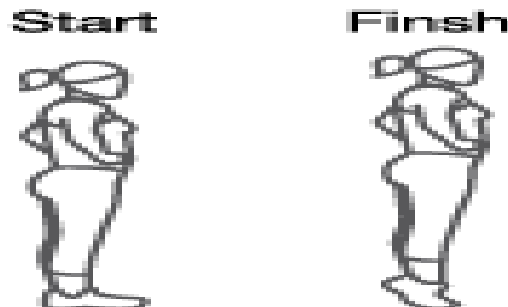
- closed chain exercise with body weight
- Double and single leg squats: (0-45)



- Lateral and forward step-ups:



- Calf raises:



Progress to leg press when tolerating 3 sets of 15 reps for two consecutive sessions without pain, swelling & instability.

- **Double and single leg press:** (when tolerating)
- Begin leg press with double leg and eventually progress to single leg.
- Begin with 50 to 75% of body weight.



Arc of Motion = 0 to 45

- **Neuromuscular Control Training:**
- Altered proprioception and lower extremity muscular control has been associated with ACL Injury.



Progression of Weight Bearing

- Progress to Full weight bearing without crutches when:
 - No extensor lag during straight leg raise.
 - 90 to 100 degrees of knee flexion.
 - No pain during ambulation.

Progress to Straight Running

- Begin with treadmill running. Must meet following criteria:
 - All criteria for full weight bearing ambulation.
 - Quad strength = 70% of uninvolved limb.
- Progress to track and road running when tolerating 1 to 2 miles of treadmill running without pain, swelling, instability.

- Criteria for Advancing to Agility Training
 - Track or Road Running for 1 to 2 miles without pain, swelling & instability.
 - Quad Strength = 80% of uninjured limb.



• Criteria for Lower Level Sport Specific Skill Training

- Tolerating all agility training at 100% effort without pain, swelling, or instability.
- Quad function = 85% of uninvolved limb.



Progress to Sprinting

- Sprinting is the act of running over a short distance at top speed.
- Incorporating all agility and low level sport specific training.
- Quad strength 85 to 90% of uninjured limb.



Modifications for Concomitant Meniscal Repair Procedure

- Must protect meniscal repair site.
- Weight bearing as tolerated with knee brace locked in extension for first 4 weeks.
- Avoid closed chain ex for first 4 weeks, then limited arc closed chain ex (0-45).
- Resisted hamstring ex and forceful stretching into flexion should be avoided for first 6 weeks.